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THE COMBINATORIAL SYNTHESIS OF NOVEL MATERIALS**RECEIVED****ABSTRACT OF THE DISCLOSURE**

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5 Methods and apparatus for the preparation and use of a substrate having an array of diverse materials in predefined regions thereon. A substrate having an array of diverse materials thereon is generally prepared by delivering components of materials to predefined regions on a substrate, and simultaneously reacting the components to form at least two materials or, alternatively, allowing the components to interact to form at least two different materials. Materials which can be prepared using the methods and apparatus of the present invention include, for example, covalent network solids, ionic solids and molecular solids. More particularly, materials which can be prepared using the methods and apparatus of the present invention include, for example, inorganic materials, intermetallic materials, metal alloys, ceramic materials, organic materials, organometallic materials, nonbiological organic polymers, composite materials (*e.g.*, inorganic composites, organic composites, or combinations thereof), *etc.* Once prepared, these materials can be screened for useful properties including, for example, electrical, thermal, mechanical, morphological, optical, magnetic, chemical, or other properties. Thus, the present invention provides methods for the parallel synthesis and analysis of novel materials having useful properties.